GPS/GIS Technologies
Supplement 1.5

How to Collect Data

Newton (Apple MessagePad)

Starting FieldWorker Pro

Step	Procedure	Explanation
1	Turn on the Newton.	Switch is on left side.
2	Tap the **Extras** icon.	Use the touch pen supplied with the unit. The word tap will be used in this document to mean actually taking the touch pen supplied with the unit and physically touching the screen and slightly pushing in on it with the end of the pen.
3	Tap **FW Pro** icon.	This starts the FieldWorker Pro.

Naming a Project

Step	Procedure	Explanation
4	Tap the **Project** icon.	Located at the top left of the screen. This will pull down a menu with the following options: **New**, **Duplicate**, **Delete**, **Rename**, **Controls**, **Import**, **Export.**
5	Tap **New**.	This will begin a totally new project. **Create New Project** window will pop up.
6	Name your new project.	On the **Create New Project Name** line, write the name of your project in one of two ways. Use the **Keyboard** to "type" the name of your project. • Tap the **Keyboard** icon (3rd icon from bottom left-hand corner of the screen). • Before the **Keyboard** can "type" the name of the project on the **Name** line, you must tap the left end of the line with the touch pen. A **caret ^** will then appear below the line allowing you to now use the **Keyboard**. • Type the name of the new project using the touch pen like you would your fingers on a keyboard. • When you have named the project, then tap the **X** at the bottom right corner of the **Keyboard icon** to close the **Keyboard.** • Then, tap the **OK** icon in the **Create New Project** window to complete your project's name. OR You may use the touch pen to print your project

		name. If there is more than one person using the Newton, our recommendation is to use the keyboard procedure above instead of each user individually training the Newton to read his/her handwriting style. (The Handwriting Supplement 1.8 is included for those who wish to try this method.)

Naming a Station

Step	Procedure	Explanation
7	Tap the **Station** icon.	This pulls down a menu with the following options: **New, Duplicate**, **Delete**, **Go to …**, **Import** and **Export**.
8	Tap **New**.	This adds a new station to the project you just created.
9	Name your new Station.	Refer to the explanation on Step 6 if you need help naming your station. In *FieldWorker Pro* all geographic data is associated with a station. A station may have both **attribute data** (a series of descriptions about what you are collecting the GPS data for at that specific location) and **location data** (the actual geographical GPS data your Newton will gather at the described site.) When you first name a project, it will be ready to collect GPS data beginning with station #1 as shown on the right end of the line under your project name. Each separate location where you want to take new GPS data should be named so that you will know where the GPS data was taken.

Picking the Shape (of your Data)

10	Tap the **Shapes** icon.	Directly below the **Station** icon on the left side of the screen is the **Shapes** icon. A point, a line or a polygon may represent a station. A **point** is represented by a dot (.), a **line** is represented by a slash (/) and a **polygon** is represented by a triangle (∆). If you are in doubt at all about what type of shape you should choose, always pick **point**. When the data is later being imported into ArcView, you can always change your data from points to lines or polygons at that time. See **Note #1**.

Note #1
Picking the Shape (of your data on the Newton)
Below is some background information on how ArcView will use these "shapes" when your data is imported into that program. This information is given here to help assist you in choosing the appropriate shape for your raw data collection.

A **theme** is a distinct set of geographic features such as counties, streets, buildings or rivers, along with the attributes for those features. Themes can be created from a variety of data sources, including existing digital maps, images, and tabular data files.

Theme features represent geographic objects (actual locations) using three basic **shapes** -- points, lines and polygons. These shapes actually comprise a set of vector coordinates representing real time data on the Earth's surface. For example, a theme may represent highways as lines, banks as points, and counties as polygons.

Theme features represent real world objects. Each feature has a location, a representative shape (point, line or polygon), and a symbol that helps to identify it and provide information about it. **Points** represent objects that have discrete locations and are too small to be depicted as areas such as utility poles, wells, train stations and schools. **Lines** represent objects that have length but are too narrow to be depicted as areas, such as freeways, rivers, railroads and utility lines. **Polygons** represent objects too large to be depicted as points or lines, such as parcels, census tracts, sales territories, counties, states and countries.

In ArcView, there are **Symbols** for points, symbols for lines, and symbols for polygons. Symbols for points often look like the features they identify. For example, the symbol for a school may be a little red schoolhouse and the symbol for an airport may be a small plane. Line symbols include thick or thin lines, solid or broken lines, and may come in a variety of colors. Polygon symbols include the colors and patterns used to fill in polygon shapes. Some colors may have a natural connection to the objects they represent such as blue for oceans and green for parks, while others may not.

In ArcView, themes based on the **shapefile** format draw more quickly. You can edit a theme based on a shapefile. You can also create your own data using the shapefile format. **Spatial data** is the source for themes and will be collected by the GPS unit and imported into ArcView. Spatial data is geographic data that stores the locations and shapes of geographic features, along with attribute information describing what each feature represents. When data from the Newton is imported into ArcView, it enters the program as shapefiles. **Shapefiles** are ArcView's GIS file format for storing location and attribute information for a set of geographic features. When collecting geographic data using the Newton and the GPS unit, consider how ArcView will use the imported data and try to pick appropriate shapes. However, **if in doubt at all what type of shape to choose, always pick points**. When the data has been imported into ArcView, you can always change your data points to lines or polygons.

GPS Preference Check

Step	Procedure	Explanation
11	Tap the **i** (information).	The **i** is located at the bottom left of the Newton screen and will take you to another screen where two options are located – **GPS Preferences** and **GPS Test**.
12	Tap **GPS Preferences.**	
13	Enter **3 Feet** under **Receiver Accuracy**.	This GPS unit is accurate to within a distance of + or - 1 meter. 1 meter could be used, but it is nice to have this number in feet simply because we visualize elevations above sea level in feet. It does not matter to ArcView which unit you display on the Newton because when the data is imported, it will automatically be converted to meters within ArcView.
14	Make sure there is a ✔ in the **Using Diff?** box.	
15	Enter **your height in feet** under **Antenna Height**.	Depending upon your height, this is a correction factor to determine how high the antenna of the GPS unit is above the ground.
16	Set the **HDOP** Mask to **3.**	
17	Set the **Max Latency** to **60 seconds**.	
18	Set the **Connect** icon to **Serial**.	
19	Set the **Baud Rate** to **9600**.	
20	Set the **Collect** to **GGA**.	
21	Set the **Display** to **Degrees & Minutes**.	
22	Set the **Grid** to **UTM**.	
23	**Ignore** the **Datum Conversion** icon.	
24	**Select** either **Automatic Trail** OR **Average.**	If you are collecting a series of points and you want a continuous trail, then select **Automatic trail**. If you are collecting only one point for a reading, then you should choose **Average from Display.** Do not use any other settings.
25	Set **Every** to **2 seconds**.	This option is given only if you choose **Automatic Trail**. It is recommended that you start with 2 seconds. See **Note #2**.

26	Set **Distance** to **2 meters**.	This option is given only if you choose **Automatic Trail**. It is recommended that you start with a distance of 2 meters. See **Note #2**.
27	Check screen to verify accurate completion of settings.	See Pocket Guide Summary listing the completed screen settings. See **Note #3**.
28	Tap the **X**.	The **X** is located in the lower right hand corner of the screen. This will close this Screen.

Note #2
Under **Every** you will have to **decide how often** you want to collect your data points. Tied very closely with your decision is **how fast** you will be traveling. The GPS unit will take points every, say 2 seconds, provided that you have moved a maximum distance of whatever value you select in the **Distance** blank. If you set **Every** 2 seconds and maximum travel of **Distance** 2 meters, but you do not move 2 meters, the unit will wait until 2 seconds pass before collecting your data point. Each time it takes a reading on an **Automatic Trail,** you will hear an audible ding! If you do not hear a noise, it will not be recording data. So, depending on how fast you are going to be traveling, you will need to play with this setting.

Note #3
Recheck these settings each time you collect a new set of GPS data.

Receiver Accuracy	3 feet
Using Diff	Check this box.
Antenna Height	Your height in feet
HDOP MASK	3
MAX Latency	60 seconds
Connect	Serial
Band	9600
Collect	GGA
Display	Degrees and Minutes
Grid	UTM
Select	Automatic Trail
Every	2 Seconds
Minimum Travel of Distance	2 Meters

GPS Test

Step	Procedure	Explanation
29	Connect the GPS unit to the Newton.	Lift the Velcro flap of the backpack exposing two cords. The coiled cord plugs into the side of the Newton.

30	Tap the **i** icon.	The **i** icon is located in the bottom left-hand corner of the Newton's screen. This action will give you the opportunity to now go to the second option of **GPS Test**. This is a quick check to see if the Newton and the GPS unit are communicating with each other and also with the satellites overhead.
31	Put GPS unit in **Transmit Mode**.	The Transmit Mode is the term used by the Newton to tell you to turn on the GPS unit. The uncoiled cord located under the backpack flap is the on/off cord. **Pull out the black end of the cord from the backpack pocket. Depress the button on the end of the black switch.** When the red light is lit, the GPS unit is in the transmit mode.
32	Tap **Test**.	If the Newton and the GPS unit are communicating with each other, data representing longitude, latitude, elevation and how many satellites are referenced will scroll across the screen. For more information, see **Note #4**.

Note #4
If the two units are not communicating, you will receive the following message: **Searching for the GPS Receiver**. You will also hear a high-pitched sound like a mouse squeaking or a bird chirping (instead of the ding heard when a data point is recorded). This sound means that it is trying to make data readings, but it is not being successful. If the Newton and GPS units are communicating, then you will be told how many satellites the GPS unit is referencing and GPS readings will continuously scroll down the screen. If not, you will be told that there are not enough satellites that can be referenced to obtain a good reading. There could be several reasons why the **not enough satellites** message would appear. Perhaps there are not enough satellites to obtain a good reading, or the GPS battery might not have enough energy to reference the satellites. Also, the batteries in the Newton could be low, or the skies might be so cloudy that the satellites cannot be accurately received.

Ready, Set, Go! . . . Stop.

Step	Procedure	Explanation
33	Tap **X** to close the **GPS Test.**	Now you have everything ready to begin collecting GPS data for whatever application you wish to collect it for.

34	Tap the **GPS** icon.	When the GPS unit is turned on and the **GPS** icon is tapped, three things will happen--the icon will turn dark, the Newton will ding, and a display will say **Establishing the starting point from the GPS Receiver**. Stand still until you hear another ding and see the longitude, latitude, elevation and how many satellites are referenced scroll across the screen. The Newton will have recorded your first data point.
35	Collect data.	After the second ding, walk the entire path for which you are collecting data points and stop.
36	Wait for another ding after stopping.	You will always want a last point to complete your data. When you arrive at the final location, wait until you hear the final ding, indicating the Newton grabbed the last point.
37	Tap the **GPS** icon again.	When you have completed collecting all of your data for the current station, tap the GPS icon again. The **GPS** icon will return to its original color and data collection will stop.
38	Continue to the next **Station**, **Project,** or **Stop.**	This supplement has given you the basics of how to collect data for a **Project**. Now, practice, practice, practice. Happy GPSing!